Clinical Olfactory Event-Related Potentials

Manual for data analysis

Smell&Taste Clinic, Departament of Otorhinolaryngology, TU Dresden Michal Pieniak, Coralie Mignot, Thomas Hummel

To download:

• Letswave software to analyze EEG data in MatLab

https://nocions.github.io/letswave6/

- Letswave scripts with the analysis pipeline
 - Script 1 for event-related potentials
 - Script 2 for time-frequency analysis
- Template to report results in .pptx

https://osf.io/5za3y/?view_only=6998f2aa50ea4e27ac5a8f3e75d6cf1c

1. Epochs selection

- Each recorded epoch needs to be visually inspected for potential eyeblinks or other types of artifacts.
- Epochs containing artifacts should not be included in the analysis.
- Final number of epochs used for analysis should be recorded.

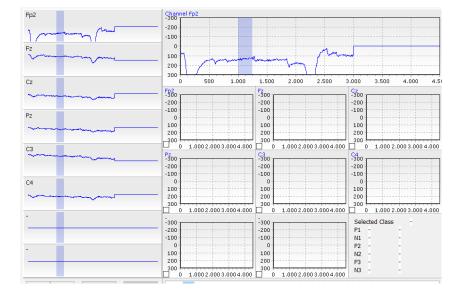
Examples of artifacts / eye-blinks (to be excluded)

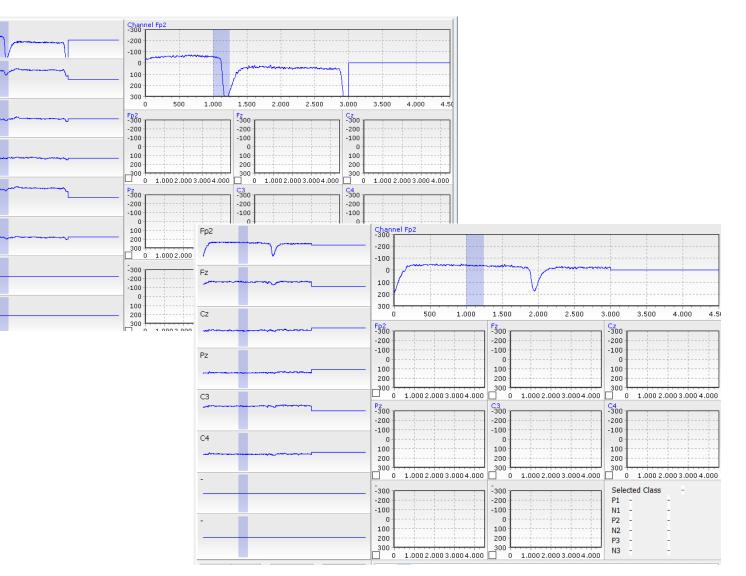
Cz

Pz

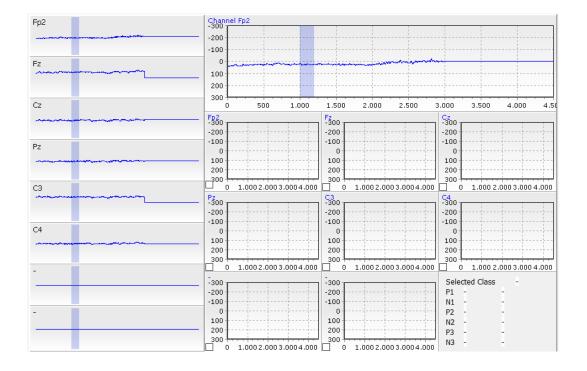
C3

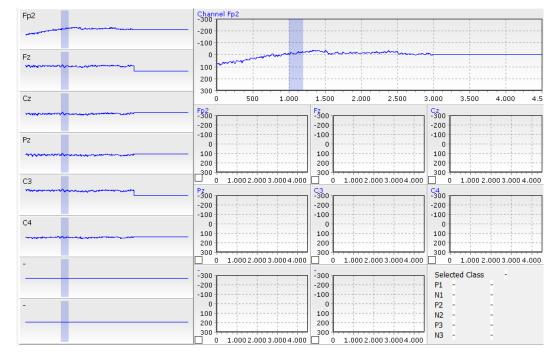
C4





Examples of artifact-free signal (good for analysis)





2. Preparing the dataset for analysis

- The original dataset is saved in .tsv file.
- First the dataset should be open in Excel for cleaning

XII Open		×	I - Excel			? – 🗇 🗙
← → ▼ ↑ ↓ > 2023.09.04	ٽ ~	, Search 2023.09.04				
Organize 🔻 New folder		III 🔹 🔟 (
Name	Date modified Type Size		▲ 23 5:07 PM 23 5:03 PM 3 3:57 PM			
			3 3:00 PM 3 3:04 PM 3 10:21 AM			
File name:	~ Tools ▼	All Excel Files (*xl*;*xlsx;*xlsm ∨ All Files (**) All Excel Files (*xl*;*xlsx;*xlsm;*xlsb Excel Files (*xl*;*xlsx;*xlsm;*xlsb;*x All Web Pages (*,htm;*,htm;*,mth;*,mth;*	lam;*.xltx;*.xltm;*.xls;*	s;*.xlt;*.htm;*.html;*.mht;*.mhtml;*.xml;*.xla;*.xlm;*.xla xla;*.xlt;*.xlm;*.xlw)	v;°.odc;°.ods)	
		XML Files (*.xml) Text Files (*.pm;*.txt;*.csv) All Data Sources (*.odc;*.udl;*.dsn;*.m Access Databases (*.mdb;*.mde;*.acc Query Files (*.idp;*.dqy;*.oqy;*.rqy) dBase Files (*.dbf) Microsoft Excel 4.0 Wacros (*.xlm;*.xl Microsoft Excel 4.0 Wachbooks (*.xlw) Worksheets (*.xlsx;*.xlsm;*.xlsb;*.xls) Workspaces (*.xlw) Templates (*.xlsx;*.xlsm;*.xlsb;*.xls) Workspaces (*.xlw) SVLK Files (*.slsx) Data Interchange Format (*.dif) Backup Files (*.xlsk;*.bak) OpenDocument Spreadsheet (*.ods)	ndb;*.mde;*.accdb;*.acc db;*.accde) a)	:de;*.dbc;*.iqy;*.dqy;*.rqy;*.oqy;*.cub;*.atom;*.atomsvc)		

• To find .tsv files – select All files

H	<u></u> চ∗ ঔ	- -												
File	Hom	e Inse	rt Pa	ge Layout	Formula	is Data	Review	View	PDF-XChan	ige Q∶	Tell me what	t you wa	nt to do	
Paste	Cut Copy Format		Calibri B I	• • • • • • • • • • • • • • • • • • •						Gene r ▼ \$ ▼		▼ €.0 .00 .00 →.0	Conditional Formatting ▼	Format as Table •
A1	Ŧ	: ×		f_{x}										
	A	в	с	D	E	F	G	н	I.	J	К	L	М	N
1														
2														
3														
5														
6					_									
7						Text Import W	/izard - Step	1 of 3					?	×
8						The Text Wiza	rd has detern	nined that v	our data is De	elimited.				
9						If this is correc					describes yo	ur data.		
10					_	Original data					-			
11 12						Choose the f	ile type that	best describ	es your data					
13						• Delim			h as commas					
14						⊖ Fixed	width - Fie	lds are aligr	ned in column	is with space	es between e	each field	l.	
15						Chard improved at	row: 1	÷ F		MS-DOS (PC	. 0)			
16						Start import at	Tom:	•	ile <u>o</u> rigin:	INIS-DOS (PC	0)			
17														
18						My data ha	s headers.							
19														
20 21						Preview of fi	le C:\Users\P	ENIAKMI\De	sktop\Kobler	nz\2023.09.0	4\Olfakto_04	1.09.2023	_AVG.tsv.	
22						1 "ID Cod 2 "Birth"								^
23						2 "Birth" 3 "Last N								
24							Name""" ot assigne	ad"						
25						< Sexn	oc assigne							> ×
26														
27									Ca	ancel		<u>N</u> e	ext > <u>F</u>	inish
28					L									

• Click Finish

⊟ ⁵	- 0													Olfakto_(4.09.2023_AV	6.tsv - Excel												- E	o ×
File	Home	e Inse	rt Page Lay	/out	Formulas	Data	Review	View	PDF-XChan	ge Ç⊺	ell me what y	ou want t	o do																R₄ Share
	Cut		Calibri	- 11	• A A	= =	= %	📴 Wra	ap Text	Gener	al	*			Iormal	Bad		Good	Ne	eutral	Calcul	ation	^ E			utoSum 👻	AT 2		
	Сору	•	в <u>г</u> <u>ч</u> -		8 - A -	. = =	= = =	🗏 Me	rae & Center	- \$ -	% , €.(.00 C	onditional F	ormat as	heck Cell	Explai	natory	Input	Lir	nked Cell	Note			Delete Fo	rmat 🚬	ill -	Sort & Find		
	Format	Painter		Font	_			nment	ige a center		Number	Fo	rmatting *	Table -									* *		* <	lear ▼ Editi	Filter * Selec	t *	
	board			Font		131	Aligi	nment		Tai I	Number	1 al I					Styl	les						Cells		Editi	ng		
E7	*		√ fx																										
A		В	С	D	E	F	G	н	1	J	к	L	м	N	0	Р	Q	R	S	т	U	v	w	х	Y	Z	AA	AB	AC
1 ID Coo	de																												
2 Birth 3 Last N	amo																												
4 First N																													
5 Sex		t assigne	ed																										
6 Measu	ure Cor	nment																											
7 Eval C		nt																											
8 User r		11 502 44		1.562.04	011 5-0.01		CH2 F- 1 / C	ua r- a f	CU2 5- 2 5	CU2 C= 1 !	cup c= 1 !:		I CH2 CT C	ICHA DE 1	ICHA D= 1.1	CHA D= 2.5	CHA D= 2.5	CUE CO 1		CUE CO O	CUE CO O		CHE CA 1	CUE CA C	CUE CA C	-n/l			
9 Curso 10 P1	i CH	11-Fp2-10 643	CH1-Fp2-1CH1 -249999	643	-249999	H2-Fz-1 (643		H2-Fz-2 (643		CH3-Cz-1 [643		H3-Cz-2: 64:				CH4-Pz-2 [643	-249999		-249999	CH5-C3-2	-249999	CH6-C4-1		CH6-C4-2 643		1141			
11 N1		1286	-149999	1286	-149999	1286		1286		1286	-149999	1280				1286	-149999	1286	-149999	1286	-149999	1286		1286					
12 P2		1929	-49999	1929	-49999	1929		1929		1929	-49999	1929				1929	-49999	1929	-49999	1929	-49999	1929		1929					
13 N2		2571	50000	2571	50000	2571	50000	2571		2571	50000	257				2571	50000	2571	50000	2571	50000	2571	50000	2571					
14 P3		3214	150000	3214	150000	3214		3214		3214	150000	3214				3214	150000	3214	150000	3214	150000	3214		3214					
15 N3		3857	250000	3857	250000	3857	250000	3857	250000	3857	250000	385	7 250000	3857	250000	3857	250000	3857	250000	3857	250000	3857	250000	3857	250000				
-	[ms] CF	IE1-En2-C	CHF2-Fz-2 CHF	3-07-20	HF4-P7-20	HE5-C3-2	CHE6-C4-2C	HE1-En2-	CHE2-E7-2	CHE3-C7-2	CHE4-P7-20	HE5-C3-	2CHE6-C4-	CHE1-En2	- CHE2-E7-2	CHE3-C7-2	CHE4-P7-2	CHE5-C3-20	HE6-C4-2	CHE1-En2-	CHE2-Ez-2	CHE3-C7-2	CHE4-P7-2	CHE5-C3-2	CHE6-C4-2	CHE1-En2-	CHE2-E7-2 (HE3-C7-20	CHE4-P7-2 CH
			1.69E+09 1.6																										
9	0	37776	158125	7767	152	146702	9622	-3588	99175	-34529	-41959	104700	-28338	-70559	98100	-29346	-18117	112406	-28206	-75140	36818	-72959	-81503	52841	-59031	-199805	26917	-52186	-58007
0	1	38524	157928	7596	238	146684	9591	-4414	99640	-34186	-42079	105070	-28162	-71999	98181	-28641	-17200	112852	-27483	-74384	36857	-72931	-81448	52691	-58885	-197538	27699	-52034	-58143
1	2	39203	157747	7482	387	146727	9621	-4977		-33907	-42317	105433				-27794	-16176	113425	-26635	-73543	36952	-72852	-81348	52592			28523	-51843	-58290
2	3	39799 40251	157588 157402	7419 7348	578 740	146829 146926	9707 9785	-5256 -5186		-33701 -33524	-42672 -43090	105775				-26823 -25800	-15074 -13969	114116 114855	-25680 -24691	-72647 -71771	37111 37290	-72724 -72597	-81205 -81064	52554 52533			29329 30096	-51662 -51499	-58486 -58727
4	4	40231	157176	7255	843	146993	9829	-4753		-33376	-43050	10650				-23800	-13909	114655	-24091		37230	-72357	-80933	52519			30856	-51310	-58965
5	6	40675	156949	7172	906	147061	9871	-4008		-33299	-44082	106846				-23665	-11850	116407	-22695	-70187	37720	-72320	-80768	52562			31602	-51103	-59195
5	7	40682	156724	7091	913	147122	9907	-2983	101821	-33286	-44656	107139	-28642	-78328	100969	-22567	-10859	117220	-21689	-69484	38017	-72128	-80567	52670	-57488	-182429	32276	-50927	-59452
7	8	40511	156449	6951	803	147113	9871	-1671		-33283	-45200	107433				-21528	-9990	117981	-20755	-68902	38318	-71955	-80370	52795		-179984	32863	-50785	-59730
В	9	40159	156116	6746	566	147016	9750	-113		-33278	-45687	10773				-20575	-9267	118660	-19920	-68462	38606	-71806	-80183	52924			33401	-50637	-59981
9	10 11	39686 39108	155770 155411	6515 6249	241 -172	146868 146664	9585 9378	1585 3353		-33305 -33350	-46126 -46495	108002				-19684 -18869	-8666 -8191	119280 119836	-19154 -18460		38918 39249	-71643 -71471	-79962 -79707	53100 53323			33890 34289	-50485 -50373	-60198 -60412
1	11	39108	155411 154996	6249 5901	-172	146004	9378	3353 5160		-33350	-46495	10822				-18869	-8191	119836	-18460	-67787	39249	-71471		53540			34289	-50373	-60622
2	13	37589	154517	5471	-1371	145934	8671	6935		-33311	-46795	108724				-17648	-7757	120563	-17459	-67812	39780	-71267	-79220	53737			34836	-50226	-60778
3	14	36741	154021	5005	-2093	145448	8214	8568	103421	-33255	-46735	108959	-29891			-17209	-7747	120764	-17115	-67908	39993	-71202	-78951	53950	-56574	-168018	35046	-50139	-60873
4	15	35897	153518	4506	-2862	144906	7714	9980		-33186	-46542	10916				-16865	-7841	120881	-16846		40176	-71154	-78653	54176			35184	-50082	-60944
5	16	35048	152972	3938	-3696	144279	7134	11156		-33057	-46176	109376				-16657	-8063	120873	-16688	-68243	40276	-71172		54364			35255	-50049	-60989
6 7	17 18	34219 33477	152385 151808	3314 2686	-4573 -5433	143572 142846	6478 5801	12056 12599		-32869 -32667	-45640 -44986	109612				-16573 -16551	-8393 -8763	120745 120561	-16637 -16630	-68502 -68758	40278 40216	-71261 -71380	-78100 -77819	54495 54606		-164139 -163021	35314 35384	-49992 -49897	-60963 -60855
8	18	32852	151808	2080	-5433	142840	5121	12599		-32007	-44980	10982				-16575	-8703		-16644		40216	-71580	-77527	54606		-163021	35384	-49897	-60708
9	20	32333	150695	1429	-7048	141380	4409	12550		-32232	-43394	110159				-16676	-9565	120067	-16712		39859	-71762		54704		-160966	35461	-49714	-60530
D	21	31925	150133	784	-7807	140629	3666	12018		-31973	-42465	11033				-16838	-10000	119739	-16833	-69394	39503	-72073	-77074	54621		-159914	35532	-49570	-60273
1	22	31683	149625	193	-8471	139936	2953	11135		-31751	-41535	110453				-16999	-10391	119426	-16946	-69538	39073	-72417	-76884	54489		-158775	35659	-49370	-59943
2	23	31620	149188	-328	-9026	139326	2292	9926		-31586	-40644	110505				-17142	-10720	119152	-17032	-69614	38576	-72793	-76719	54307		-157570	35799	-49164	-59592
3	24 25	31691 31876	148786 148420	-820 -1271	-9511 -9925	138767 138265	1640 1001	8488 6898	104699 104614	-31446 -31343	-39782 -38981	110530 110528			107804 107714	-17302 -17474	-11021 -11291	118884 118626	-17133 -17257	-69664 -69701	37976 37270	-73243 -73766	-76626 -76616	54027 53637		-156279 -154829	35948 36158	-48955 -48693	-59227 -58809
15	25	22211	146420	-1271	-3323	137878	1001	5177		-31345	-30501	110320				-17604	-11251	118020	-17257	-69693	36510	-73700	-76657	53182			36/137	-46055	-30005
>		Olfakto	_04.09.2023_A	VG	+													: •											Þ
Ready																										III 🗉	U	1	+ 100

• This is the default view of the dataset. In the first rows it contains Participants data. Further, each row is represents 1ms of the EEG signal and columnd represent signal at different electrodes for different stimuli.

ۍ د ک													Olfakto_04	.09.2023_AVC	6.tsv - Excel											Ē	5 —	
Ho	ome Inse	rt Page	Layout	Formulas	Data	Review	View	DF-XChang	je Q⊺	ell me what y	ou want to	do																∕₽, sr
Cut		Calibri		1 • A /					Gener			≠		ormal	Bad		Good	Ne	utral	Calcula	ation				utoSum ×	Azy 🖌		
	nat Painter	в <i>I</i> <u>U</u>	• 🗄 •	👌 - 🛕	• = =	= • •	🗄 Mer	ge & Center	- \$-	% * 5	0.00 Cor	nditional Fo	ormat as	ieck Cell	Explan	atory	Input	Lin	ked Cell	Note		- Insert	Delete Fo	rmat 🥑 C		Sort & Find Filter ▼ Seleo	8	
Clipboard			Font		5	Alic	nment		5	Number	For	natting *	lable *			Style	es						Cells		Editi			
																- 1/ 1												
	* I >	< ✓ .	fx CHF	F3-Cz-1-96	[nV]																							
UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ
	CHF3-Cz-1(1.69E+09		HF5-C3-1 1.69E+09				CHF3-Cz-1 1.69E+09						CHF3-Cz-1 1.69E+09						AVF3-Cz-14 1.69E+09									
11773		45827	26854		48301	1.69E+09 -7566	1.09E+09	6824	-22407	-43323	246937	79484	73404	53325	44893	15812	-11609	32100	1.692+09	13529	38726	-18564	2620	45355	5933	1.69E+09	54133	
9379		43077	24401	-23060	49542	-5958	2959	8826	-20566	-41668	247168	80036		53788	45387	16331	-11562	32076	1729	13485	38702	-18607	2372	45280	5898	16862	54085	-7644
6611	34306	40060	21611	-25731	50701	-4484	4567	10702	-18854	-40134	247406	80693	74487	54388	46022	16932	-11507	32045	1686	13433	38668	-18655	2132	45197	5850	16843	54029	-7691
3541	31163	36850	18560	-28628	51758	-3164	6024	12426	-17296	-38732	247597	81403	75159	55075	46744	17563	-11448	32006	1635	13375	38628	-18706	1908	45111	5792	16811	53967	-7753

- In the last colums, the labels are starting with AVF and not CHF. The AVF columns represent the averaged signal from the 6 locations (Fp2, Fz, Cz, Pz, C3, C4) for the two stimuli (in total 12 columns).
- We want to keep only the AVF columns.

<u>ب</u> وا	¢												Olfakto_04	.09.2023_A\	/G.tsv - Excel											٥	Ð –		×						
e F	lome I	nsert P	age Layout	Formulas	Data	Review	View	PDF-XChan	ge ⊊⊺	ell me what y	ou want to	do																∕£ Shi	are						
<mark>ж</mark> а		Calibri	*	11 × A	_ = =	- »/·	🖶 Wra	ap Text	Gener	al	-		N	ormal	Bad		Good	Ne	utral	Calcula	tion	^ (2	ΣΑ	utoSum 👻	A (
Co 🖻	ору т	D 7	u 1873	A 4	·		= =		¢	0(+ f	Lon Cor	ditional For	_	ock Coll	Expla	natory	Input	Lie	ked Cell	Note			Delete Form			Sort & Find									
🛛 💖 Fo	rmat Painte	L P T	<u>u</u> •	· <u>· · A</u>	* = =		= E Mer	rge & Cente	, , , , , , , , , , , , , , , , , , ,	% * 1.0	Form	natting * Ta	ble -	leck cell	Explu	natory	mput	Cit.	keu cen	Note			* *	CI		ilter * Selec									
Clipbo	ard	5	Font		5	Ali	gnment		F9	Number	G.					St	tyles						Cells		Editin	g			^						
	-	×✓	fr																										~						
A	В	С	D	E	F	G	Н	1	J	К	L	М	N	0	Р	Q	R	S	Т	U	V	W	Х	Y	Z	AA	AB	AC	<u> </u>						
D Code																																			
lirth																																			
ast Nam irst Nan																													-						
	ne not assig	med																																	
	Commen	-											Call?	11		0/	- FR																		
val Com															• A A 4																				
lser nan													BI	= 💁 -	<u>A</u> • 🗄 •	00 00	v																		
ursor	CH1-Fp2	-1CH1-Fp	-1CH1-Fp2-	2 CH1-Fp2-2	CH2-Fz-1	[CH2-Fz-1 [CH2-Fz-2 [CH2-Fz-2 [CH3-Cz-1	CH3-Cz-1	CH3-Cz-2	CH3-Cz-2 0			CHA PZ-2	CH4-Pz-2	CH5-C3-1	CH5-C3-1	CH5-C3-2	CH5-C3-2	CH6-C4-1	CH6-C4-1	CH6-C4-2 C	H6-C4-2 [nV]										
1	64	3 -2499	9 64	-249999	643	-249999	643	-249999	643	-249999	643	-249999	% 0	ut	643	-249999	9 643	-249999	643	-249999	643	-249999	643	-249999											
11	128	6 -1499	9 128	5 -149999	1286	-149999	1286	-149999	1286	-149999	1286	-149999	in C	ору	286	-149999	9 1286	-149999	1286	-149999	1286	-149999	1286	-149999											
2	192	9 -499	9 192	-49999	1929	-49999	1929	-49999	1929	-49999		-49999	📑 🖻 🖪	aste Option	ns: 929	-49999	9 1929	-49999	1929	-49999	1929	-49999		-49999											
12	257					50000	2571			50000		50000	l (l 🗊 (571					50000		50000		50000											
3	321					150000	3214		3214			150000		iste Special	2.14	150000				150000		150000		150000											
13	385	7 2500	385	7 250000	3857	250000	3857	250000	3857	250000	3857	250000			857	25000	0 3857	250000	3857	250000	3857	250000	3857	250000					_						
	10051.5-	2 01152 5	2 CUE2 C-			CHF6-C4-2	CUE1 5-0	CUE2 5- 2	CUE2 C= 2					sert	c= 2	CUEA De	2 CHF5-C3-2		01151 5-0	CUE2 5- 24					CUE1 5-2 (E 5	• ∂ - ÷								
	· ·					1.69E+09							1.0	elete	400		2 CHF5-C3-2 9 1.69E+09											Insert Pa						DDC YChar	
	0 3777				146702		-3588	99175			104700		C	ear Co <u>n</u> ten	ts 👘		7 112406		-75140	36818	-72959	-81503			-199805	File		nsen Pa	sge Layout	rormula	s Data	Review	View		ige.
	1 3852				146684		-4414						. 📰 Eq	rmat Cells.		-17200			-74384	36857	-72931	-81448	52691		-197538	i 📑 👸		Calibri		• 11 • A	A = 3	= *	• Wra	ap Text	
	2 3920	3 1577	748	2 387	146727	9621	-4977	100075	-33907	-42317	105435	-28071		olumn Widt	th 794	-1617	5 113425	-26635	-73543	36952	-72852	-81348	52592		-195131		Format Painte	BI	<u>u</u> - E	- 8-	A - = =	= =	🚈 🗮 Me	rge & Center	er +
	3 3979	9 1575	38 741	578	146829	9707	-5256	100463	-33701	-42672	105775	-28080	н	ide	823	-15074	4 114116	-25680	-72647	37111	-72724	-81205	52554	-58450	-192650		board	6	Fon		6	· · .	Alianment		5
	4 4025	1 1574	02 734	3 740	146926	9785	-5186	100844	-33524	-43090	106132	-28138	. U	nhide	800	-13969	9 114855	-24691	-71771	37290	-72597	-81064	52533		-190130										
	5 4053	2 1571	76 725	5 843	146993	9829	-4753	101222	-33376	-43552	106507	-28232	-10/00		-2++753	-12896	5 115612	-23702	-70956	37479	-72477	-80933	52519	-57993	-187561	\$19	*	× ✓	f _x						
	6 4067				147061		-4008				106846	-28401	-77644	100296				-22695	-70187	37720	-72320	-80768	52562		-184968	A	В	С	D	E	F	G	н	1	
	7 4068				147122		-2983				107139	-28642	-78328	100969				-21689	-69484	38017	-72128	-80567	52670		-182429	1									
	8 4051				147113		-1671			-45200	107433	-28890	-78846	101660				-20755	-68902	38318	-71955	-80370	52795		-179984	2									
	9 4015						-113		-33278	-45687	107735	-29119	-79202	102342		-926		-19920	-68462	38606	-71806	-80183	52924		-177625	4									
1		6 1557 8 1554			146868 146664		1585		-33305 -33350		108002	-29359 -29599	-79349	103043	-19684	-8666	5 119280 1 119836	-19154	-68130 -67893	38918	-71643	-79962 -79707	53100		-175370 -173279	5									
	T 39TC	1554	624	-1/2	140004	93/8	3353	102//1	-33350	-40495	108227	-29599	-/92/3	103754	-18869	-819.	1 119830	-18460	-0/893	39249	-/14/1	-/9/0/	23323	-30/22	-1/32/9	6									

• Select all columns except the AVF columns and delete them

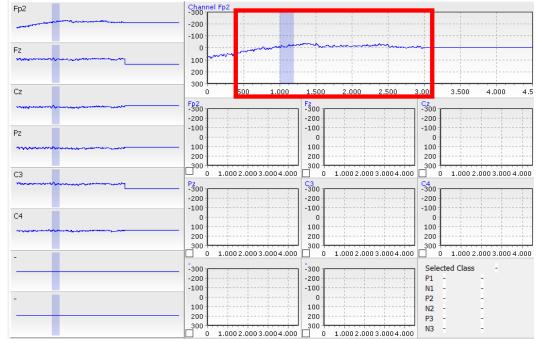
Afterwards the dataset should look like that \rightarrow

4	🔄 🔏 Cut					• = _			-					FTTL.	
	Cop	v ~	Calibri	- 1	1 • A .	A = =	= **	🔐 Wra	ap lext	Gener	al	*	×.	- Ore	Normal
Pas		, nat Painter	BIL	1 • 🖽 •	👌 - 🔼	• = =	=	🖻 🗮 Me	rge & Center	- \$ -	% *		nditional matting *	Format as	Check Co
	Clipboar			Font		6	AI	ignment		6	Number	5	maring	iabic.	
	_	¥ : 5													
S 1	9	* = _ ;	×	f_X											
1	Α	В	с	D	E	F	G	н	1	J	К	L	M	N	0
1															
2															
3															
4 5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15 16															
	AVEL-Ep2	AV/E2-E7-1	AVE2-C7-1	AVE4-07-1	AVE5.C2.1	AVE6-C4-1	AVEL-En2	AVE2-E7-2	AVF3-Cz-2	AVE4-07-7	AVES-C2-	AVE6-CA-3	(n)/l		
18									1.69E+09				. [114]		
19	-11609	32100	1762	13529	38726	-18564	2620	45355	5933	16864	54133	-7614			
20	-11562	32076	1729	13485	38702	-18607	2372	45280	5898	16862	54085	-7644			
21	-11507	32045	1686	13433	38668	-18655	2132	45197	5850	16843	54029	-7691			
22	-11448	32006	1635	13375	38628	-18706	1908	45111	5792	16811	53967	-7753			
23	-11391	31956	1573	13310	38578	-18762	1715	45030	5732	16771	53907	-7822			
24	-11344	31893	1499	13235	38516	-18825	1558	44954	5668	16725	53851	-7898			
25	-11309	31818	1417		38445	-18894	1437	44882	5599	16670	53795	-7984			
26	-11286	31736	1331	13076	38370	-18962	1358	44819	5532	16612	53744	-8075			
27 28	-11280 -11295	31647 31550	1243 1152	12997 12918	38292 38210	-19031 -19102	1329 1349	44772 44741	5473 5425	16559 16514	53706 53682	-8162			
29	-11255	31451	1063	12518	38128	-19102	1349	44741	5385	16314	53669	-8243			
30	-11376	31355	982	12781	38055	-19234	1509	44723	5358	16447	53669	-8396			
31	-11438	31265	911	12730	37990	-19287	1646	44743	5352	16437	53688	-8452			
32	-11514	31181	849	12690	37934	-19334	1811	44782	5365	16446	53725	-8495			
33	-11596	31110	803	12667	37892	-19370	1990	44833	5394	16469	53774	-8526			
34	-11678	31058	776	12664	37870	-19388	2176	44897	5440	16510	53834	-8546			
35	-11753	31027	770	12682	37869	-19389	2364	44976	5507	16571	53909	-8547			
36	-11820	31015	781	12718	37885	-19375	2541	45064	5591	16649	53994	-8534			
37 38	-11874 -11905	31025 31063	813 869	12773 12850	37922 37983	-19345 -19293	2694 2813	45154 45242	5685 5787	16738 16836	54081 54168	-8514 -8488			
39	-11903	31125	944	12850	38063	-19293	2815	45242	5898	16942	54108	-8453			
40	-11892	31207	1034	13053	38159	-19137	2938	45409	6012	17052	54336	-8415			
41	-11841	31311	1141	13174	38270	-19036	2928	45475	6120	17157	54404	-8382			
42	-11757	31435	1263	13309	38397	-18917	2868	45526	6221	17254	54458	-8355			
43	-11642	31575	1395	13450	38534	-18786	2765	45565	6318	17346	54501	-8331			
44	-11501	31723	1531	13594	38673	-18649	2619	45589	6405	17427	54530	-8314			
15	-11336	21976	1670	12727	38814	-18507	2/132	45593	6476	17/190	54540	-8310			
		Uirakte	04.09.202	DVA_C	÷										

	🔥 🔏 Cut					1								
		, .	Calibri	* 11	· A A	· = = :	<u> </u>	루 Wra	ap Text	Gene	ral	*	≠	- Off
t	e	nat Painter	BIL	<u>j</u> + 🗄 +	<u>ð</u> - <u>A</u> -		= -	🗄 🖽 Me	rge & Center	- \$ -	% *		nditional F matting •	
	Clipboard			Font			Alio	nment		G	Number	For Fa	matting *	lable
								,						
8	3	• E	×	<i>f</i> _x 1693	831238									
	А	В	С	D	E	F	G	Н	1	J	К	L	М	1
						Lu								
					_		A A \$		÷					
					BI	🗏 * 🙆 🗏	• 🗄 • 🕇	.0 .00 💉						
					_ <mark>X</mark> Cu <u>t</u>									
					Copy									
					Past	e Options:								
					ĥ									
1	VF1-Fp2	AVF2-Fz-1	AVF3-Cz-1	AVF4-Pz-1A		e <u>S</u> pecial	-1-Fp2-	AVF2-Fz-2	AVF3-Cz-2	AVF4-Pz-2	AVF5-C3-2	AVF6-C4-2	2 [nV]	
ļ	1.69E+09	1.69E+09	1.69E+09	1.69E+09			59E+09	1.69E+09	1.69E+09	1.69E+09	1.69E+09	1.69E+09		
	-11609	32100	1762	13529			2620	45355	5933	16864	54133			
	-11562	32076	1729	13485	<u>D</u> elet		2372	45280	5898	16862	54085	-7644		
	-11507	32045	1686	13433		r Co <u>n</u> tents	2132	45197	5850	16843	54029	-7691		
	-11448	32006	1635	13375	Eorn	nat Cells	1908	45111	5792	16811	53967	-7753		
	-11391 -11344	31956 31893	1573 1499	13310 13235	Row	Height	1715 1558	45030 44954	5732 5668	16771 16725	53907 53851	-7822 -7898		
	-11344	31855	1433	13156	<u>H</u> ide		1437	44882	5599	16670	53795	-7858		
	-11286	31736	1331	13076	<u>U</u> nhi	de	1358	44819	5532	16612	53744			
	-11280	31647	1243	12997	38292	-19031	1329	44772	5473	16559	53706			
	-11295	31550	1152	12918	38210	-19102	1349	44741	5425	16514	53682	-8245		
	-11328	31451	1063	12844	38128	-19172	1409	44724	5385	16474	53669	-8324		
	-11376	31355	982	12781	38055	-19234	1509	44723	5358	16447	53669	-8396		
	-11438	31265	911	12730	37990	-19287	1646	44743	5352	16437	53688	-8452		
	-11514	31181	849	12690	37934	-19334	1811 1990	44782	5365	16446	53725	-8495		
	-11596 -11678	31110 31058	803 776	12667 12664	37892 37870	-19370 -19388	2176	44833 44897	5394 5440	16469 16510	53774 53834			
	-11753	31038	770	12682	37869	-19389	2364	44976	5507	16571	53909	-8547		
	-11820	31015	781	12718	37885	-19375	2541	45064	5591	16649	53994	-8534		
	-11874	31025	813	12773	37922	-19345	2694	45154	5685	16738	54081	-8514		
	-11905	31063	869	12850	37983	-19293	2813	45242	5787	16836	54168	-8488		
	-11911	31125	944	12945	38063	-19222	2896	45328	5898	16942	54254			
	-11892	31207	1034	13053	38159	-19137	2938	45409	6012	17052	54336			
	-11841	31311	1141	13174	38270	-19036	2928	45475	6120	17157	54404			-
	-11757	31435	1263	13309	38397	-18917	2868	45526	6221	17254	54458			
	-11642 -11501	31575 31723	1395 1531	13450 13594	38534 38673	-18786 -18649	2765 2619	45565 45589	6318 6405	17346 17427	54501 54530	-8331 -8314		
	-11301	31/23	1531		38073	-18049	2019	45589	6405	17427	54530			
ĺ	Þ		04.09.202		+									
	v	-												

 We now remove the first row (inluding headers) so only the raw data stays in the file

- Now, we have all the raw data, but for the analysis we want to keep only 500 ms before the stimulus onset and 2000 ms after the simulus onset. All the remaining data should be removed.
- How much data should be removed depends on your olfactometer and amplifier settings (some hardware records 1000 ms before the onset, some more; that's the same for the recording afterwards)
- In the example below first 500 ms and all the signal after 2000 ms post stimulus onset should be removed



9	🔏 Cut		Calibri	* 11	• A A	. = =	≡ %·*	😽 Wrap	lext	Genera	1	•	¥ 🐺	No	ormal	Bad		Good	Neu	utral	Calcul	ation	-	Þ	Σ	AutoSum	ĭ <mark>A</mark> Ţ	ρ		
te	Copy Forma		BIU	• 😐 •	🕭 - <u>A</u>	- = =	= = =	🛄 Merge	& Center	- \$ -	% * 58	Cond	litional Format atting - Table	t as Ch	neck Cell	Expland	ntory	Input	Link	ked Cell	Note			elete Form	nat	Clear •	Sort & Filter *			
	Clipboard	G		Font		r5	Aligr	nment		G I	Number	ronna ra	atting • Table				Styl	es						 Cells			diting	Select *		
00	-		×	6. 499	7																									
00																														
_	A	B	C	D	E	F	G	H	1	J 16017	K	L	M	N	0	Р	Q	R	S	T	U	V	W	Х	Y	Z	AA	AB	A	IC .
	-4108 -4103	33438 33413		13175 13034	38255 38189	-17759 -17875	-4640 -4683	44486 44435	6346 6302	15914	55024 54936	-8873 -8940																		
	-4101	33380		12876	38118	-18008	-4717	44390	6266	15828	54860	-8998																		
	-4100	33341	1141	12707	38049	-18149	-4734	44358	6246	15768	54807	-9039																		
	-4099	33298		12532	37982	-18298	-4723	44350	6252	15743	54789	-9056																		
	-4104	33247		12353	37918		• 11 • A				54809	-9045																		
	-4111 -4119	33193 33138		12180 12020	37861 37818	BI	🗏 • 🙆 🗏	• 🖽 • %	.00 →.0 🎺	15807 15902	54868 54970	-9007 -8941																		
	-4129	33083		11878	37789			44627	6582	16044	55122	-8838																		
	-4145	33027		11757	37774	Cut		44786	6752	16230	55320	-8703																		
	-4166	32972		11665	37777	En Cop		44975	6949	16453	55555	-8543																		
	-4190	32921		11608	37800		te Options:	45192	7172	16711	55826	-8358																		
	-4222 -4263	32873 32825		11585 11595	37842 37898	a	🗟 🤹	45435 45696	7419 7681	17002 17315	56128 56451	-8148 -7921																		
	-4313	32778		11642	37969	Past	e <u>S</u> pecial	45961	7945	17637	56781	-7688																		
	-4371	32734	753	11724	38054	Inse	rt	46224	8204	17961	57107	-7455																		
	-4437	32690		11838	38149	<u>D</u> ele	te	46481	8454	18281	57423	-7224																		
	-4515 -4604	32642 32590		11975 12133	38245 38340	Clea	r Co <u>n</u> tents	46718 46922	8683 8877	18583 18850	57716 57968	-7005 -6812																		
	-4004	32590		12133	38340	Eorn	nat Cells	40922	9031	18850	57968	-6651																		
	-4804	32477		12485	38516	Row	Height	47211	9141	19258	58320	-6522																		
	-4917	32409	1063	12662	38583	Hide	2	47285	9200	19383	58406	-6435																		
	-5037	32332		12829	38630	Unh		47301	9200	19441	58420	-6397																		
	-5158 -5278	32249 32159		12983 13115	38659 38664	-18783 -18735	-942 -1062	47259 47165	9141 9029	19433 19359	58360 58231	-6410 -6470																		
	-5398	32059		13218	38642	-18705	-1002	47103	8863	19219	58033	-6579																		
	-5513	31952		13288	38593	-18692	-1497	46818	8641	19011	57765	-6738																		
	-5617	31842	928	13327	38523	-18695	-1799	46576	8376	18743	57439	-6942																		
	-5707	31732		13332	38431	-18713	-2137	46303	8078	18428	57069	-7178																		
	-5784 -5842	31621 31515		13303 13244	38320 38197	-18750 -18800	-2498 -2871	46008 45698	7755 7415	18073 17687	56665 56234	-7441 -7727																		
	-5873	31421		13244	38070	-18856	-2871	45386	7072	17087	55795	-8023																		
	-5879	31340		13060	37942	-18918	-3578	45091	6742	16883	55367	-8312																		
	-5858	31274		12944	37819	-18983	-3876	44821	6434	16494	54960	-8588																		
	-5808	31228		12823	37708	-19044	-4124	44582	6153	16126	54584	-8846																		
	-5726 -5613	31209 31215		12708 12603	37619 37555	-19093 -19129	-4305 -4406	44384 44240	5913 5725	15793 15511	54252 53981	-9073 -9255																		
	-5015	31215		12505	37555	-19129	-4406	44240	5593	15287	53775	-9255																		
	-5310	31305		12451	37510	-19152	-4351	44122	5515	15123	53633	-9476																		
	-5119	31392		12418	37540	-19129	-4194	44148	5496	15025	53561	-9510																		
	-4909	31505		12417	37602	-19083	-3949	44234	5537	14999	53563	-9485																		
	-4688 -4459	31637 31786		12449 12514	37694 37813	-19017 -18930	-3626 -3241	44373 44553	5634 5774	15041 15144	53632 53756	-9405 -9281																		
1	-4227	31948		12514	37956	-18822	-2804	44766	5953	15303	53929	-9115																		
	-3000	32116	1387	17728	3811/	-18700	-7378	45007	6164	15512	54145	-8911													_					
	P	Olfakte	o_04.09.2023	AVG	(+)													E 4												

 Remove the first 500ms by marking the row A500 and using the combination Ctrl+Shift+Arrow Up

	5 • ∂ ·	_												Jifakto	_04.09.2023_AVG.	tsv - Excel												m —	0
le N	Home K Cut	Inse	ert Page Li							: ⊊ Tel	l me what yo		1			_													ይ
9	n∋ Cut È Copy ⊸		Calibri	- 11	Ă Ă	==	- ** ·	😽 Wrap '	Text	General		-	ι 🗉		Normal	Bad		Good	N	leutral	Calcula	ition	•	- 🔭		AutoSum Fill •	* 🛃 🏅	5	
æ	i≣ Copy ♥ ≸ Format	r n · .	BIU	-	ð - A -	===	€ →	🗮 Merge	& Center	- \$ - 9	6 , 50	.00 Conditi	nal Form	iat as	Check Cell	Expla	natory	Input	Li	inked Cell	Note		Inse	rt Delete Fo	ormat		Sort & Fin		
	ipboard	Painter		Font				nment			umber	Formatt	ng∗ Tab	le -		_	Sty						· ·	* Cells	• <	Clear *	Filter - Sele	ect *	
CI	ippoard					SE I	Alig	nment		Da IN	umber	EM 1					Sty	ies						Cells		E	iting		
01	-	+ >	< 🗸 fa	0																									
	A	В	С	D	E	F	G	н	1	J	К	L	M	N	0	р	Q	R	S	т	U	V	W	X	Y	Z	AA	AB	AC
	2803	35459		14466	39949	-15923	13918	47489	4733	13418	53862	-10783							-	-									
	2972	35622	3248	14495	40064	-15829	13883	47394	4647	13330	53750	-10873																	
	3107	35769		14515	40159	-15748	13872	47309	4580	13272	53654	-10940																	
	3205	35898		14526	40236	-15679	13887	47240	4534	13245	53577	-10979																	
	3266	36004		14526	40290	-15627	13930	47188	4514	13250	53522	-10988																	
	3287	36082		14515	40318	-15595	13997	47150	4513	13280	53486	-10973																	
	3273	36135		14496	40323	-15579	14077	47120	4520	13323	53460	-10943																	
	3229 3160	36166		14476 14453	40311 40282	-15575 -15583	14168 14271	47097 47085	4536 4561	13377 13440	53442 53437	-10898 -10840																	
	3068	36161		14435	40282	-15605	14271	47085	4588	13440	53437	-10840																	
	2959	36127		14406	402.54	-15636	14476	47066	4606	13558	53431	-10712																	
	2842	36082		14393	40111	-15670	14565	47050	4616	13600	53422	-10655																	
	2723	36026		14388	40044	-15706	14642	47034	4619	13632	53411	-10602																	
	2603	35961	3156	14391	39974	-15746	14704	47014	4612	13648	53394	-10558																	
	2489	35890	3098	14405	39907	-15786	14743	46986	4591	13646	53368	-10527																	
	2386	35820		14432	39848	-15822	14759	46952	4558	13626	53334	-10511																	
	2295	35749		14470	39796	-15855	14758	46917	4519	13597	53299	-10502																	
	2215	35677		14515	39749	-15888	14739	46881	4476	13559	53262	-10500																	
	2147	35605		14567	39709	-15920	14700	46843	4427	13513	53222	-10511																	
	2094 2051	35536		14626 14686	39678 39651	-15949 -15978	146	ζ Cu <u>t</u>	-	13467 13430	53185 53160	-10528 -10542																	
	2031	35392		14080	39624	-16015	145	<u>с</u> ору	,	13430	53148	-10542																	
	1980	35311		14791	39596	-16057		Paste Op	tions:	13395	53148	-10560																	
	1950	35225		14835	39566	-16105	1439	Ê. 🗭		13406	53166	-10560																	
	1918	35130		14867	39531	-16161	1435			13446	53210	-10546																	
	1879	35020	2455	14883	39483	-16232	1432	Paste Spe	cial	13517	53280	-10515																	
	1832	34896	2346	14882	39423	-16316	143:	Insert	3	13615	53373	-10473																	
	1779	34759		14866	39353	-16409	143:	<u>D</u> elete	3	13743	53490	-10417																	
	1718	34609		14835	39269	-16515	1435	Clear Co <u>n</u>	tents	13903	53635	-10342																	
	1644	34440		14783 14715	39168	-16635 -16768	144	Eormat Ce	ells	14090	53803	-10253																	
	1561 1473	34257 34064		14/15	39052 38925	-16768	144:	Row Heig	ht	14295 14514	53987 54185	-10156 -10052																	
_	0	54004 C		14030	0	0		Hide	2	14514	0	-10032																	
	0	C		0	0	0		Unhide)	0	0	0																	
	0	C	0	0	0	0	U	0	U	0	0	0																	
	0	C	0	0	0	0	С	alibri - 11	· A A	\$ - %	, 📄)	0																	
	0	C	-	0	0	0		s I ≡ Ô				0																	
	0	C	•	0	0	0	_				5	0																	
	0	C	-	0	0	0	0	0	0	0	0	0																	
	0	0	0	0	0	0	0	0	0	0	0	0																	
	0	0		0	0	0	0	0	0	0	0	0																	
	0	0	-	0	0	0	0	0	0	0	0	0																	
	0	C		0	0	0	0	0	0	0	0	0																	
	0		0	0	0	0	0	0	0	0	0	0																	
	Þ	Olfakto	_04.09.2023_	AVG	\oplus													: ◀											
																						A	verage: 0	Count: 156	5 Sum: 0	=	e – –		
4	Q Typ		to search					(1)		-														_		-		t ⊑ 4×	1

• Remove everything after 2500ms of the signal of interest (A2500) by using the combination Ctrl+Shift+Arrow Down (go to the end of the file)

3. Preprocessing in Matlab

- For preprocessing we use Letswave program (ver. 6)
- To use letswave you need to set a path to the folder with the program

MATLAB R2018b - academic use		🔚 🔏 🛍 🐄 🗇 🖨 🔁 🕐 💌 Search Documentatio	- 🗇
New New Open Compare Import Save Op Live Script • •			
	CODE SIMULINK ENVIRONMENT RESOURCES		
t Folder ♥	2023.09.04 Command Window	() Workspace	
Name A	New to MATLAB? See resources for <u>Getting Started</u> .	× Name ▲ Value	
01fakto_04.09.2023_AVG.tsv Dlfakto_04.09.2023.tsv	$f_{\xi} >> \qquad \qquad - \Box \times$	Name A Value	
	All changes take effect immediately. Add Folder Add vith Subfolder Add with Subfolder C\Vergram Files\MATLAB\R2018b\toolbox\matlab\effun Add with Subfolder C\Vergram Files\MATLAB\R2018b\toolbox\matlab\effun Move to Top C\Vergram Files\MATLAB\R2018b\toolbox\matlab\u00ex		

Select letswave6, close the window and do not save the path for future MATLAB sessions

📣 Add to Path with Subfolders

Make sure that Matlab file location matches the folder where your dataset is stored

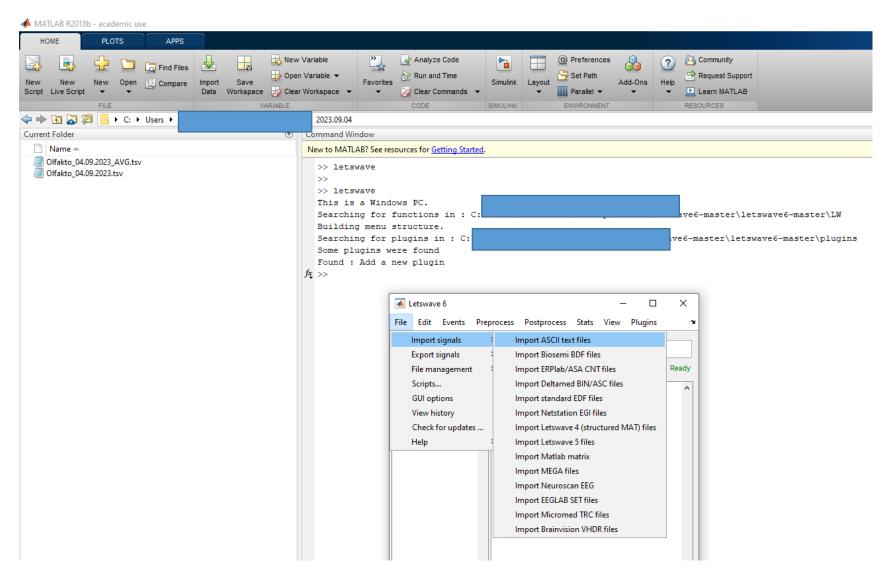
	New Variable Open Variable Open Varia	link Layout → Set Path Add-Ons Heip → Request Support	
→ 🔁 💭 💭 📙 → C: → Users	> 2023.09.04		
Name	New to MATLAB? See resources for <u>Getting Started</u> .	= 2023.09.04	Workspace A
Olfakto_04.09.2023_AVG.tsv Olfakto_04.09.2023.tsv	fs. >>	File Home Share View Image: Composition of the state of the stat	Open - Eslect all
		access P Paste shortcut to - to - folder Cliphoard Droapize New ← → - ↑ ▲ → 2023.09.04 - √ (Properties Control Co
alis		Olfakto_04.09.2023.tsv 12-Oct-23 9:43 AM	Type Size TSV File 34,813 KB TSV File 175 KB
Select a file to view details			

Use command >letswave to open the program

MATLAB R2018b - academic use HOME PLOTS APPS Lo New Variable 🛷 Analyze Code -52 🔄 Find Files \checkmark by Open Variable 👻 Run and Time Favorites New New Compare Save Simulink New Open Import 뉟 Clear Workspace 👻 Script Live Script Workspace Data 🚧 Clear Commands 📼 VARIABLE FILE CODE SIMULINK 🗢 🔶 🔁 🤝 → C: → Users → 2023.09.04 Current Folder \odot Command Window Name 🔺 New to MATLAB? See resources for Getting Started. Olfakto_04.09.2023_AVG.tsv fx >> letswave Olfakto_04.09.2023.tsv

Import the data to letswave using the

following path



Select your clear .tsv file, choose tab column delimiter and change epoch size to 2500 (default is 1000). Click Process

Note: sometimes an error occurs at this stage, then you need to reload letswave again

	Select files		
Olfakto_04.09.2023_AVG.tsv			^
			¥
Header size (number of lines) :	0	Column delimiter(s)	
Import channel labels		space comma tab semicolumn	^
Channel labels (line position) :	0		
Continuous data (one single e	poch)		
Epoch size (number of lines) :	2500		
Samplingrate (Hz) :	1000		
XStart (latency of first	-0.5		¥
Characters to delete from channe	l labels : "	Process	

We have two scripts prepared: 1. for averaging the signal and 2. time-frequency analysis

承 Letswave 6 X Preprocess Postprocess Stats View Plugins Edit Events Import signals 2\2023.09.04 Export signals Ready > atasets File management Scripts... fakto 04.09 GUI options View history Check for updates ... Help Number of channels : 12 Epoch size : 2500 Number of epochs found : 1 Finished. Olfakto 04.09 Saving : * Finish View datasets Read from workspace Send to workspace

To use them, open File \rightarrow Scripts

We have two scripts prepared: 1. for averaging the signal and 2. time-frequency analysis

承 Letswave 6 X Preprocess Postprocess Stats View Plugins Edit Events Import signals \2023.09.04 Export signals Ready File management > atasets Scripts... fakto 04.0 GUI options View history Check for updates ... Help Number of channels : 12 Epoch size : 2500 Number of epochs found : Finished Olfakto 04.09 Saving * Finished Process View datasets Read from workspace Send to workspace

To use them, open File \rightarrow Scripts

Load and run script (each script needs to be loaded separately)

	👞 Load script	
🕢 Letswave 6 - Scripts — 🗆 🗙	← → ∽ ↑ 🔄 → This PC → Desktop → LetswaveScripts	
data files : Olfakto_04.09	Organize 🔻 New folder	
script items library : File <empty> Add Insert Delete Λ V Configure script : <empty> Save script Load script Build script from dataset Clear script</empty></empty>	V Point Access Desktop Documents CWT-avg_TFA.lwscript Cont-20 3:3 26-Aug-21 2:5	✓ Letswave 6 - Scripts data files : Olfakto_04.09 script items library : File <empty> Add Insert Delete Automatic Configure script Insert Delete Automatic Clear script</empty>
overwrite input datasets prefix : scrpt Run script		overwrite input datasets prefix : scrpt Run script

There are two new files in the workspave

承 Letswave 6							-	- 🗆	×
File	Edit	Events	Preproc	ess	Postprocess	Stats	View	Plugins	Ľ
R	т	C:\Users			:\20	23.09.04			r
Filto	er :	1	Dat	asets	:				Ready
bl bl2 but cwt scrpt	o_04.09		SCI	rpt bl2	14.09 ut Olfakto_04 cwt bl but Olfa				
xend :	: -0.4 bi -0.1 bir tion : su	n : 401							^
Finish		e			19.0	4\scrpt b	l2 cwt b	l but Olfakto	_04
	Vie	w datasets	5	Re	ead from works	space	Se	nd to works	pace

Scrpt bl but \rightarrow for averaged OERPs

Scrpt bl2 cwt bl but \rightarrow for timefrequency analysis

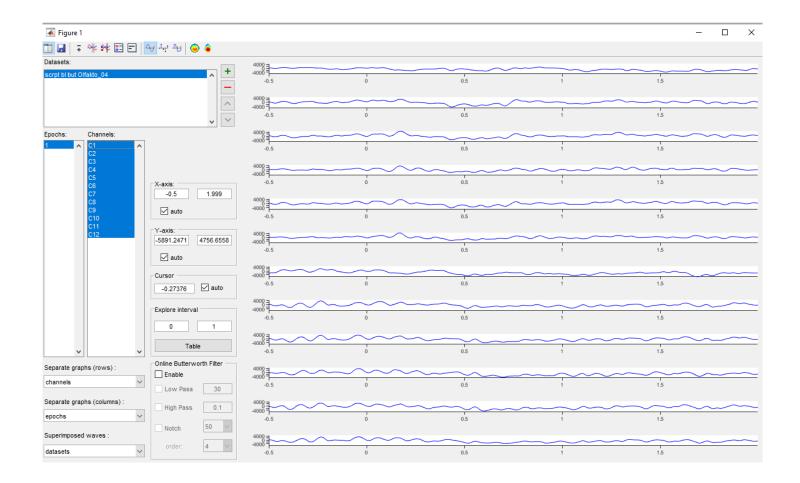
For OERPs \rightarrow View -> Waveform multiviewer

承 Letswave 6		– 🗆 × , _{do}
File Edit Events Pr	eprocess Postprocess Stats	View Plugins 🏻
		Waveform multiviewer
R T C:\Users	z\2023.09.04	Waveform average multiviewer
Filter :	Datasets :	Waveform continuous data viewer
Olfakto_04	Olfakto_04.09	Map multiviewer
Olfakto_04.09 bl	scrpt bl but Olfakto_04 scrpt bl2 cwt bl but Olfakto_04	Figures
bl2	Scipt biz Cwr bi but Ollakto_04	SEEG viewer
but cwt		Event viewer : view signal at event latencies
scrpt		Generate table and graphs with ROI data
		Generate table and graphs with SSEP data
		Epoch data viewer
		×
~	E:1 C:12 X:2500 Y:1 Z:1 I:1	
xstart : -0.4 bin : 101 xend : -0.1 bin : 401		<u>^</u>
operation : subtract		
Finished. Saved : C:\Us	09.04\scrpt b	I2 cwt bl but Olfakto_04
*** Finished surger		►
View datasets	Read from workspace	Send to workspace

All the averages are visible now. There are 12 channels. First 6 channels are for Stimulus 1, channels 7-12 are for Stimulus 2.

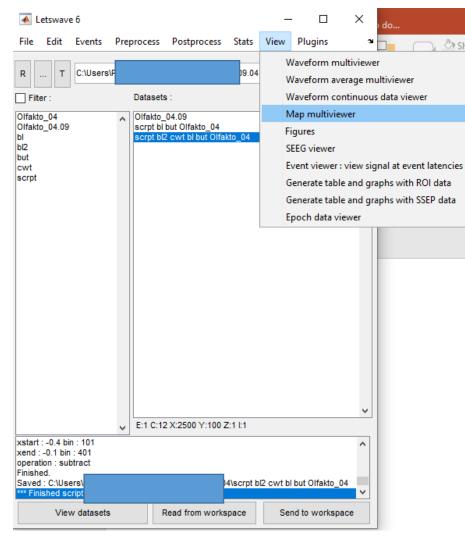


Select all the channels and set the Y-axis range to the same value for all of them



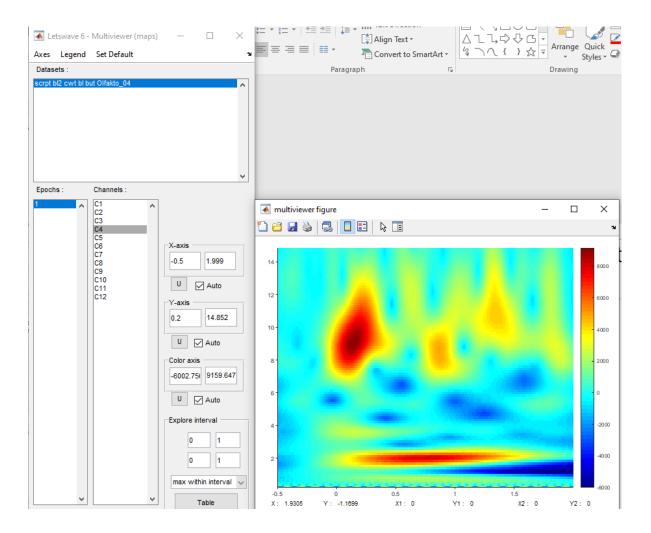
Now each of the OERPs might be saved for the final report (we use the Snipping tool and paste the images into the template)

To view the time-frequency maps: View: Map multiviewer



TFA we do for Pz location. These are channels 4 and 10.

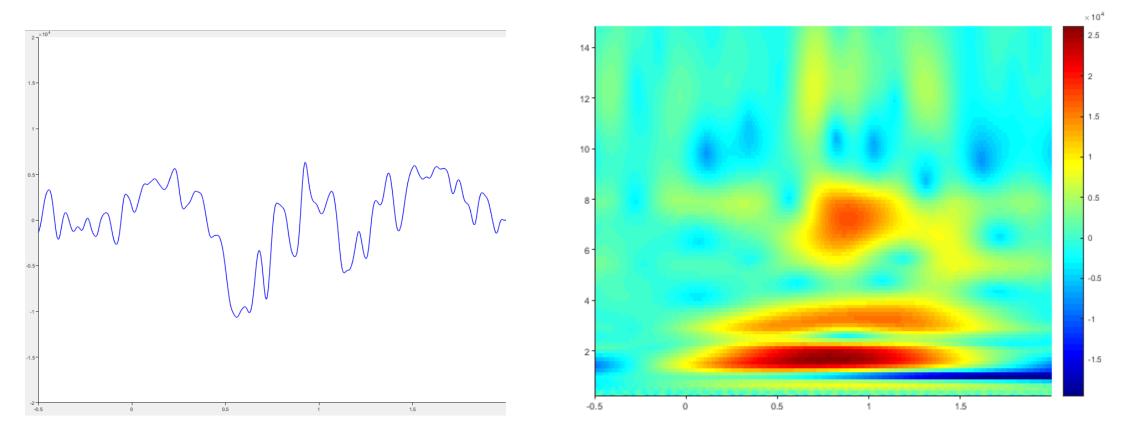
Select the channel and add the Color Legend. Save the map using Snipping tool.



Template for reporting OERPs

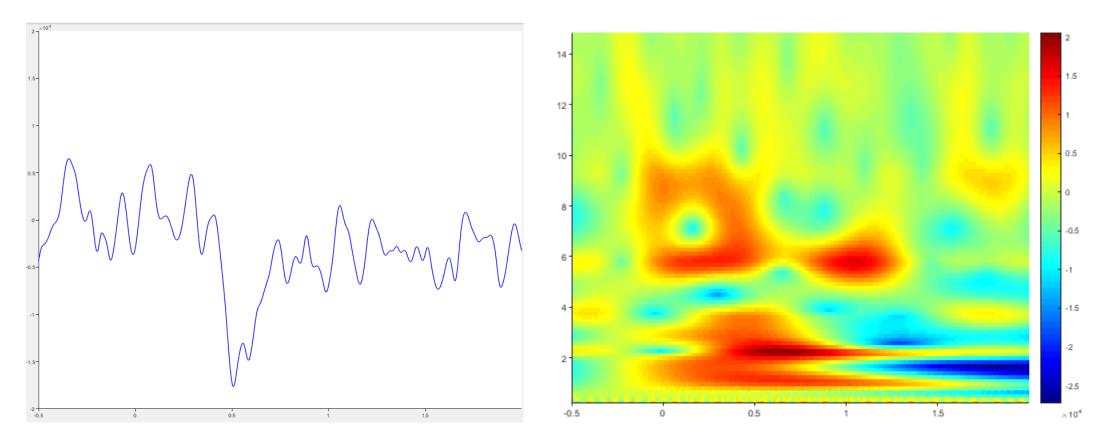
1 Time-frequency analysis from Pz					
Stimulus 1, n= Stimulus 2, n=					
	Stimulus 2, n=				
	Fp2	Cz	C3		
	1 02				
2 Stimulus 1, ne					
² Simulus 1, n ^π Fp2 Cz C3					
Fz. Fz. C4					
ra Ca	Ez	<u>Pz</u>	C4		
Kens, Gas					
3 Stimulus 2, n=					
Fp2 Cz C3					
Fz Pz C4					
	Name, Date				
Stars, Star					

Examples of OERPs showing olfactory responses, together with time-frequency view



OERPs should be visible around 0.5s after stimulus onset. In TFA low frequencies should be present.

Examples of trigeminal ERPs showing trigeminal responses, together with time-frequency view



Trigeminal ERPs should be visible around 0.5s after stimulus onset. In TFA low frequencies should be present.